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Validation of a brief screen for Post-Traumatic Stress Disorder with substance use disorder patients

Rachel Kimerling [a,*], Jodie A. Trafton [b], Brian Nguyen [b]

[a] National Center for PTSD, VA Palo Alto Health Care System, 795 Willow Road (PTSD-334), Menlo Park, CA 94025, USA
[b] Program Evaluation and Resource Center, VA Palo Alto Health Care System and Stanford University School of Medicine, 795 Willow Road (152-MPD), Menlo Park, CA 94025, USA

Abstract

To evaluate a 4-item screen for Post-Traumatic Stress Disorder (PTSD) for use with patients diagnosed with substance use disorders, 97 patients were recruited from substance use disorder treatment clinics at a large medical center. Participants completed the self-administered 4-item PTSD screen. Psychologists interviewed patients using the Clinician Administered PTSD Scale (CAPS). Sensitivity and specificity were calculated using the CAPS as the criterion for PTSD. Results were compared to chart diagnoses.

The prevalence of PTSD was 33%. The screen identified 91% of PTSD cases, where only 25% of PTSD cases were diagnosed in the medical chart. The screen demonstrated good test–retest reliability (r=.80) and yielded a sensitivity of .91 and specificity of .80 using a cut score of 3. Likelihood ratios indicate that the screen has good ability to detect PTSD in this population, and that patients with positive screens that do not meet criteria for PTSD are likely to report significant subthreshold symptoms. Screening for PTSD in SUD treatment settings is time efficient and may increase the detection of previously unrecognized PTSD.

Keywords: PTSD; Screening; Detection; Diagnosis; Substance use disorders

* Corresponding author. Tel.: +1 650 493 5000x23218; fax: +1 650 617 2701.
E-mail addresses: Rachel.Kimerling@med.va.gov (R. Kimerling), Jodie.Trafton@va.gov (J.A. Trafton), brian308@stanford.edu (B. Nguyen).

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1. Introduction

Individuals with Post-Traumatic Stress Disorder (PTSD) are at more than 4 times the risk for substance use disorders (SUD) than the general population (Chilcoat & Breslau, 1998) and are over represented in SUD treatment settings. Substance abuse patients with comorbid PTSD present with greater drug abuse severity (Clark, Masson, Delucchi, Hall, & Sees, 2001) demonstrate greater trauma and drug cue-elicited drug craving (Coffey et al., 2002; Saladin et al., 2003) and have poorer SUD treatment outcomes (Ouimette, Brown, & Najavits, 1998) than SUD patients without PTSD. Less than one-third of PTSD-SUD patients achieve abstinence 2 years following treatment (Ouimette, Moos, & Finney, 2000) and recent research suggests that an exacerbation of PTSD symptoms may be the most important factor in predicting relapse following substance abuse treatment (Ouimette, Moos, & Finney, 2003).

Improving detection of PTSD is a necessary first step to effectively treat comorbid patients. Research suggests that PTSD most often goes unrecognized in SUD treatment settings (Dansky, Roitzsch, Brady, & Saladin, 1997). Substance use may mask PTSD symptoms, or clinicians may be reluctant to explore traumatic material in substance using patients. However, comorbid patients that receive PTSD treatment are 3.7 times more likely to achieve long-term remission from substance use (Ouimette et al., 2003) as compared to comorbid patients whose PTSD goes untreated.

The current study focuses on a 4-item screen for DSM-IV PTSD that is widely used in VA settings (Prins et al., 2004). The PC-PTSD screen was designed to detect PTSD in primary care, and focuses on meaningful, empirically derived symptom clusters of PTSD: re-experiencing, numbing, avoidance, and hyperarousal (Asmundson et al., 2000; Walker, Newman, Dobie, Ciechanowski, & Katon, 2002). Because 90% or more of the general population will experience a traumatic event in their lifetime, assessment of trauma exposure was excluded from the screen items for its lack of specificity to the PTSD diagnosis (Breslau et al., 1998). In primary care, the PC-PTSD has an optimal cut score of 3, which yields a sensitivity of .78, a specificity of .87, and an 83% agreement with a full diagnostic interview for PTSD. Diagnosis of anxiety and depressive disorders is generally more difficult in patients with substance use disorders (Anthenelli & Schuckit, 1993), and additional data is needed to determine the utility of this screen to identify PTSD in this population. The goal of the current study was to evaluate the psychometric properties the PC-PTSD screen among patients in SUD treatment settings.

2. Methods

2.1. Protocol

A convenience sample of 97 individuals was recruited from substance use treatment clinics at a large VA medical center. A research assistant obtained informed consent, administered the 4-item PC-PTSD Screen (Prins et al., 2004) (Table 1), and administered a brief psychometric battery which included the Addiction Severity Index (McLellan, Kushner, Metzger, & Peters, 1992). The PC-PTSD Screen took approximately 1 to 2 min to complete. Master's level staff trained to 100% reliability interviewed participants using the Clinician Administered PTSD Scale (CAPS) (Blake et al., 1995). At the conclusion of the interviews participants were given a copy of the PC-PTSD screen and a prepaid mail

Table 1
Short screening scale for PTSD

Item	Test–retest kappa
In your life, have you ever had any experience that was so frightening, horrible, or upsetting that, *in the past month you…*	
1. Had nightmares about it or thought about it when you did not want to?	.85
2. Tried hard not to think about it, or went out of your way to avoid situations that reminded you of it?	.55
3. Were constantly on guard, watchful, or easily startled?	.62
4. Felt numb or detached from others, activities, or your surroundings?	.54

Responses are YES = 1 or NO = 0. The scale is scored by summing all responses. Scale scores may range from 0 to 4.

envelope addressed to the study PI and asked to fill out and return it within 1 week. Participants received a $20.00 gift certificate to the VA retail store in return for participation. The Stanford University Panel on Medical Human Subjects approved this project.

2.2. Data analysis

The PC-PTSD screen is scored by summing the affirmative responses, with scores ranging from 0 to 4. On the CAPS, participants were scored positive for a symptom when the sum of the intensity and frequency measures was greater than or equal to 4. A Spearman rank correlation was calculated to assess test–retest reliability for an ordinal scale, while kappa coefficients were used to determine agreement for individual items. We calculated sensitivity, the proportion of all cases that were detected (detected true positives/prevalence) and specificity, the proportion of all negative cases that were detected (detected true negative cases/(1 − prevalence)) for each possible score. To determine the optimal cut-score for follow-up, we calculated quality indices for sensitivity and specificity, weighted kappa coefficients that reflect the accuracy of the test (or optimal point on the ROC curve) while accounting for the influence of the prevalence of the disorder (Kraemer, 1992; McNeil, Keller, & Adelstein, 1975). We used a coefficient weighted equally for sensitivity and specificity to determine the optimal cut-score. In addition, we calculated likelihood ratios (ratio of the proportion of people with and without PTSD within a stratum of the screen results) for all scores. Likelihood ratios (LR) measure the power of a screen result to change the probability of PTSD being present (Sackett & Straus, 1988).

3. Results

The mean age of the sample was 47.9 years ($SD = 8.3$, range 23 to 74); 98% were male; self-identified race/ethnicity was 44.7% White, 40.4% Black, 9.6% Hispanic; and 5.3% Native American. All patients were diagnosed with substance dependence by a VA clinician. ASI composite drug scores ranged from 0 to .49 ($M = .16$, S.D. = .13), and ASI composite alcohol scores ranged from 0 to .99 ($M = .40$, S.D. = .31). In the 30 days before entering treatment, 63% of patients used alcohol, 44% used cocaine or amphetamines, 31% used cannabis, 12% used heroin or illicitly obtained opioid medications, and 5% used benzodiazepines or barbiturates. At the time of the interview, 79% were in residential treatment, 17% were in outpatient treatment and 4% were in outpatient methadone maintenance treatment for

Table 2
Properties of the 4-item PTSD screen at different cutoff scores ($N=97$)

PTSD screen cut-points	Sensitivity	Specificity	Efficiency	Positive predictive value	Negative predictive value
≥1	.97	.45	.62	.46	.97
≥2	.97	.57	.70	.53	.97
≥3	.91	.80	.84	.69	.95
4	.69	.86	.80	.71	.85

The base rate of PTSD was 33% as indicated by the CAPS.

substance use disorders. There was no significant difference in types of substances used based on CAPS diagnosis, although there was a trend toward less stimulant use in subjects with PTSD (51% of CAPS negative versus 31% of CAPS positive subjects used stimulants (ANOVA, $df=96$, $F=3.357$, $p=.070$).

A total of 32 patients (33%) received a diagnosis of PTSD based on the CAPS interview. An additional 13 patients (12.8%) met criteria for partial or subthreshold PTSD, defined as meeting criteria for 2 out of 3 PTSD symptom clusters, or at least one symptom in each symptom cluster on the CAPS (Mylle & Maes, 2004; Schnurr, Lunney, Sengupta, & Waelde, 2003). Only 8 of the 32 patients (25%) diagnosed by the CAPS had any diagnosis of PTSD in their medical chart. The mean PC-PTSD score was 2.11 (S.D.=1.66) with individual scores ranging from 0 to 4. The mean PC-PTSD score for the mail-back responses was 2.4 (S.D.=1.63; range 0 to 4). A Spearman rank correlation indicated good test–retest reliability, $r(54)=.80$, $p<.0001$. Test–retest kappas for individuals items ranged from .54 to .85, and are listed in Table 1.

Signal detection analyses revealed that the PC-PTSD scale had an optimally efficient cutoff score of 3 ($k(.5)=.65$), with a sensitivity rate of .91, a specificity rate of .80, a positive predictive value of .69, and a negative predictive value of .95. Using this cut-off score, there was an 83.5% agreement with the CAPS, and screen correctly identified 90.6% of PTSD cases. Table 2 illustrates the properties of the screen at each possible cut score.

Likelihood ratios were calculated for each screen score (Table 3). These indicate that scores below 3 significantly reduce the pre-test probability that a patient has PTSD, where scores of 3 and 4 increase the pre-test probability that a patient has PTSD. We also calculated likelihood ratios for the post-test probability that a patient had clinically significant symptoms of PTSD, as indicated by either full or partial PTSD. Likelihood ratios for scores of 3 (LR=5.26) and 4 (LR=10.72) were greater for full/partial PTSD than for the PTSD diagnosis only, suggesting that most patients who screen positive have either a PTSD diagnosis or clinically significant partial or subthreshold PTSD symptoms.

Table 3
Likelihood ratios for the 4-item PTSD screen

PTSD screen result	CAPS PTSD diagnosis		Likelihood ratio	CAPS full or partial PTSD diagnosis		Likelihood ratio
	Present *n* (%)	Absent *n* (%)		Present *n* (%)	Absent *n* (%)	
0–1	1 (3.1)	35 (54.7)	0.06	5 (11.1)	33 (63.5)	0.17
2	2 (6.3)	14 (21.9)	0.29	3 (6.7)	14 (26.9)	0.25
3	7 (21.9)	4 (6.3)	3.48	9 (20.0)	2 (3.8)	5.26
4	22 (68.8)	11 (17.2)	4.0	28 (62.2)	3 (5.8)	10.72
Totals	32 (100)	64 (100)		45 (100)	51 (100)	

Screen results for 0 and 1 were combined to prevent empty cells.

4. Discussion

The PC-PTSD is an empirically valid and widely used screen for PTSD in primary care, and also appears useful for substance use treatment settings. The cut score of 3 is the same as that obtained in primary care samples (Prins et al., 2004) and the screen demonstrates the excellent reliability, sensitivity, and specificity with SUD patients that is observed with Primary Care Patients. Our results indicate that the PC-PTSD is a reliable and valid screen to detect PTSD in SUD treatment settings.

The current under detection of PTSD in clinical settings was notable among our sample: 75% of comorbid PTSD cases went undiagnosed. Notably, patients assessed in this study were utilizing SUD treatment at a VA medical center that housed several PTSD specialty programs and a PTSD education center; lack of recognition even in a setting with such resources underscores the difficulties in detecting and addressing traumatic material with SUD patients. It is likely that the majority of comorbid PTSD in VA SUD clinics goes undetected and untreated, leaving these patients at increased risk for relapse. Administration of the brief, self-administered 4-item screen improved detection of PTSD to over 90%. Our results replicated the high concordance of the screen with a full diagnostic interview for PTSD, and indicate the PC-PTSD is an accurate and resource efficient method to substantially improve the detection of PTSD in SUD treatment settings.

While detection is clearly the most important characteristic of any screening instrument, false positives may also be a concern for busy clinics without the resources to follow-up large numbers of cases. Our analyses indicate that the 88% of patients with positive screen results met criteria for either full or partial PTSD. Partial PTSD is associated with significant impairment in a variety of domains (Mylle & Maes, 2004), and more research in needed to determine whether patients with partial PTSD are also at risk for poor SUD treatment outcomes. However, these results indicate that almost all patients with positive screens would likely benefit from adjunct PTSD-focused treatment.

Brief, self-administered PTSD screens, such as this one, can identify patients with probable PTSD without a lengthy or specific trauma assessment and help clinicians in SUD treatment settings avoid the "Pandora's Box" (Sugg & Inui, 1992) of trauma assessment. This screening process is free of unnecessary detail about potentially upsetting or overwhelming material. The operating characteristics obtained in this study are comparable to those obtained with other treatment seeking populations. Additional research is needed to determine the generalizability of the results of this screen to populations outside the VA and its relative merits compared to other primary care PTSD screens. However, brief screens, such as this one, that do not pose an undue burden on clinic resources or clinician time are practical methods for improving the detection of PTSD in SUD treatment settings, and potentially improving rates of long-term remission from substance use among comorbid patients.

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